

What is claimed is:

1. A sulfonated aliphatic-aromatic copolyester comprising an acid component, a glycol component, and 0 to about 5.0 mole percent of a polyfunctional branching agent; wherein said acid component comprises:
 - a. about 94.9 to 10.0 mole percent of an aromatic dicarboxylic acid component based on 100 mole percent total acid component,
 - b. about 5.0 to 80.0 mole percent of an aliphatic dicarboxylic acid component, based on 100 mole percent total acid component, and
 - c. about 0.1 to about 5.0 mole percent of a sulfonate component;and wherein said glycol component consists essentially of:
 - a. 100.0 to 90.0 mole percent of 1,3-propanediol as a first glycol component, based on 100 mole percent total glycol component, and
 - b. 0 to 5.0 mole percent of a second glycol component, based on 100 mole percent total glycol component.
2. The sulfonated aliphatic-aromatic copolyester of claim 1, having an inherent viscosity of at least 0.15, as measured on a 0.5 percent solution of the copolyester in a 50:50 solution of trifluoroacetic acid:dichloromethane solvent system at room temperature.
3. The sulfonated aliphatic-aromatic copolyester of claim 2, wherein said inherent viscosity is at least 0.35 dL/g.
4. The sulfonated aliphatic-aromatic copolyester of claim 1 wherein said second glycol component is selected from the group consisting of ethylene glycol, 1,3-propanediol, 1,6-hexanediol,

1,8-octanediol, 1,10-decanediol, 1,12-dodecanediol, 1,14-tetradecanediol, 1,16-hexadecanediol, dimer diol, 4,8-bis(hydroxymethyl)-tricyclo[5.2.1.0/2.6]decane, 1,4-cyclohexanedimethanol, isosorbide, di(ethylene glycol), tri(ethylene glycol), poly(alkylene ether)glycols in the molecular weight range of about 500 to about 4000, and mixtures derived therefrom.

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5. The sulfonated aliphatic-aromatic copolyester of claim 1 wherein said sulfonate component is selected from the group consisting of metal salts of 5-sulfoisophthalic acid and metal salts of dimethyl 5-sulfoisophthalate.

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6. The sulfonated aliphatic-aromatic copolyester of claim 1 wherein said aromatic dicarboxylic acid component is selected from the group consisting of: terephthalic acid, dimethyl terephthalate, bis(2-hydroxyethyl)terephthalate, bis(3-hydroxypropyl)terephthalate, bis(4-hydroxybutyl)terephthalate, isophthalic acid, dimethyl isophthalate, bis(2-hydroxyethyl)isophthalate, bis(3-hydroxypropyl)isophthalate, bis(4-hydroxybutyl)isophthalate; 2,6-naphthalene dicarboxylic acid, dimethyl-2,6-naphthalate, 2,7-naphthalenedicarboxylic acid, dimethyl-2,7-naphthalate, 3,4'-diphenyl ether dicarboxylic acid, dimethyl-3,4'-diphenyl ether dicarboxylate, 4,4'-diphenyl ether dicarboxylic acid, dimethyl-4,4'-diphenyl ether dicarboxylate, 3,4'-diphenyl sulfide dicarboxylic acid, dimethyl-3,4'-diphenyl sulfide dicarboxylate, 4,4'-diphenyl sulfide dicarboxylic acid, dimethyl-4,4'-diphenyl sulfide dicarboxylate, 3,4'-diphenyl sulfone dicarboxylic acid, dimethyl-3,4'-diphenyl sulfone dicarboxylate, 4,4'-diphenyl sulfone dicarboxylic acid, dimethyl-4,4'-diphenyl sulfone dicarboxylate, 3,4'-benzophenonedicarboxylic acid, dimethyl-3,4'-benzophenonedicarboxylate, 4,4'-benzophenonedicarboxylic acid, dimethyl-4,4'-benzophenonedicarboxylate, 1,4-

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naphthalene dicarboxylic acid, dimethyl-1,4-naphthalate, 4,4'-methylene bis(benzoic acid), dimethyl-4,4'-methylenebis(benzoate), and mixtures derived therefrom.

- 5 7. The sulfonated aliphatic-aromatic copolyester of claim 1,
 wherein the acid component comprises from about 85 to about
 20 mole percent of said aromatic dicarboxylic acid component.
- 10 8. The sulfonated aliphatic-aromatic copolyester of claim 1,
 wherein the acid component comprises from about 80 to about
 20 mole percent of said aromatic dicarboxylic acid component.
- 15 9. The sulfonated aliphatic-aromatic copolyester of claim 1,
 wherein said aliphatic dicarboxylic acid component is selected
 from the group consisting of oxalic acid, dimethyl oxalate,
 malonic acid, dimethyl malonate, succinic acid, dimethyl
 succinate, methylsuccinic acid, glutaric acid, dimethyl glutarate,
 bis(2-hydroxyethyl)glutarate, bis(3-hydroxypropyl)glutarate,
 bis(4-hydroxybutyl)glutarate, 2-methylglutaric acid, 3-
20 methylglutaric acid, adipic acid, dimethyl adipate, bis(2-
 hydroxyethyl)adipate, bis(3-hydroxypropyl)adipate, bis(4-
 hydroxybutyl)adipate, 3-methyladipic acid, 2,2,5,5-
 tetramethylhexanedioic acid, pimelic acid, suberic acid, azelaic
 acid, dimethyl azelate, sebacic acid, 1,11-undecanedicarboxylic
25 acid, 1,10-decanedicarboxylic acid, undecanedioic acid, 1,12-
 dodecanedicarboxylic acid, hexadecanedioic acid,
 docosanedioic acid, tetracosanedioic acid, dimer acid, and
 mixtures derived therefrom.
- 30 10. The sulfonated aliphatic-aromatic copolyester of claim 1 wherein
 said aliphatic dicarboxylic acid component is selected from the
 group consisting of succinic acid, dimethyl succinate, glutaric
 acid, dimethyl glutarate, bis(2-hydroxyethyl)glutarate, bis(3-
 hydroxypropyl)glutarate, bis(4-hydroxybutyl)glutarate, adipic

acid, dimethyl adipate, bis(2-hydroxyethyl)adipate, bis(3-hydroxypropyl)adipate, bis(4-hydroxybutyl)adipate and mixtures derived therefrom.

- 5 11. The sulfonated aliphatic-aromatic copolyester of claim 1,
 wherein the acid component comprises from about 15 to about
 80 mole percent of said aliphatic dicarboxylic acid component.
- 10 12. The sulfonated aliphatic-aromatic copolyester of claim 1,
 wherein the acid component comprises from about 20 to about
 60 mole percent of said aliphatic dicarboxylic acid component.
- 15 13. The sulfonated aliphatic-aromatic copolyester of claim 1,
 wherein said branching agent is selected from the group
 consisting of: 1,2,4-benzenetricarboxylic acid; trimethyl-1,2,4-
 benzenetricarboxylate; tris(2-hydroxyethyl)-1,2,4-
 benzenetricarboxylate; tris(3-hydroxypropyl)-1,2,4-
 benzenetricarboxylate; tris(4-hydroxybutyl)-1,2,4-
 benzenetricarboxylate; 1,2,4-benzenetricarboxylic anhydride;
20 1,3,5-benzenetricarboxylic acid; 1,2,4,5-benzenetetracarboxylic
 acid; 1,2,4,5-benzenetetracarboxylic dianhydride; 3,3',4,4'-
 benzophenonetetracarboxylic dianhydride; 1,4,5,8-
 Naphthalenetetracarboxylic dianhydride; citric acid;
 tetrahydrofuran-2,3,4,5-tetracarboxylic acid; 1,3,5-
25 cyclohexanetricarboxylic acid; pentaerythritol; Glycerol; 2-
 (hydroxymethyl)-1,3-propanediol; 2,2-
 bis(hydroxymethyl)propionic acid; and mixtures derived
 therefrom.
- 30 14. The sulfonated aliphatic-aromatic copolyester of claim 1,
 wherein the copolyester comprises from 0 to about 1.0 mole
 percent of said branching agent.

15. The sulfonated aliphatic-aromatic copolyester of claim 1, having an inherent viscosity of at least about 0.65 dL/g.
- 5 16. The sulfonated aliphatic-aromatic copolyester of claim 1, further comprising a filler.
- 10 17. The sulfonated aliphatic-aromatic copolyester of claim 16, wherein said filler comprises a first set of particles having a first average particle size, and a second set of particles having a second average particle size, and wherein second average particle size is at least about 2 times that of said first average particle size.
- 15 18. The sulfonated aliphatic-aromatic copolyester of claim 16, wherein said filler consists essentially of particles having an average diameter less than about 40 microns.
- 20 19. The sulfonated aliphatic-aromatic copolyester of claim 16, wherein said filler consists essentially of particles having an average diameter less than about 20 microns.
- 25 20. A blend comprising a sulfonated aliphatic-aromatic copolyester of claim 1 and at least one other polymer.
- 30 21. The blend of claim 20 wherein said other polymer is biodegradable.
22. The blend of claim 21 wherein said biodegradable polymer is selected from the group consisting of poly(hydroxy alkanoates), polycarbonates, poly(caprolactone), aliphatic polyesters, aliphatic-aromatic copolyesters, aliphatic-aromatic copolyetheresters, aliphatic-aromatic copolyamideesters, sulfonated aliphatic-aromatic copolyesters, sulfonated aliphatic-

aromatic copolyetheresters, sulfonated aliphatic-aromatic
copolyamideesters, and mixtures derived therefrom.

- 5 23. The blend of claim 20 wherein said other polymer is
nonbiodegradable.
24. The blend of claim 20 wherein said other polymer is a natural
polymer.
- 10 25. The blend of claim 24 wherein said natural polymer is a starch.
26. A shaped article formed from a sulfonated aliphatic-aromatic
copolyester of claim 1.
- 15 27. A shaped article of claim 26 selected from the group consisting
of films, sheets, fibers, melt blown containers, molded parts, and
foamed parts.
28. A film comprising the sulfonated aliphatic-aromatic copolyester
20 of claim 1.
29. The film of claim 28, having a thickness from about 0.025 mm to
about 0.15 mm.
- 25 30. An oriented film according to claim 29.
31. The film of claim 30 wherein said film is biaxially oriented.
32. The film of claim 30 wherein said film is uniaxially oriented.
- 30 33. A multilayer film comprising a layer comprising a sulfonated
aliphatic-aromatic copolyester of claim 1.

34. An article comprising a substrate and a coating on said substrate, said coating comprising an aliphatic-aromatic copolyetherester of claim 1.
- 5 35. The article of claim 34 wherein said coating has a thickness from about 0.2 to about 15 mils.
36. The article of claim 34 wherein said coating has a thickness from about 0.5 to about 2 mils.
- 10 37. The article of claim 34 wherein said substrate is selected from the group consisting of textiles, nonwovens, foil, paper, paperboard, and metals.
- 15 38. An article comprising a substrate having laminated thereon a sulfonated aliphatic-aromatic copolyester of claim 1.
39. The article of claim 38 wherein said substrate is selected from the group consisting of paper, paperboard, cardboard, fiberboard, cellulose, starch, plastic, polystyrene foam, glass, metals, polymeric foams, organic foams, inorganic foams, organic-inorganic foams, and polymeric films.
- 20 40. A package comprising an article of claim 39.
- 25 41. A wrap comprising a sulfonated aliphatic-aromatic copolyester of claim 1.
42. A sheet comprising a sulfonated aliphatic-aromatic copolyester of claim 1.
- 30 43. The sheet of claim 42, having a thickness of at least about 0.50 mm.

44. A fiber comprising a sulfonated aliphatic-aromatic copolyester of claim 1.
- 5 45. The fiber of claim 44 having a denier from about 0.1 to about 100.
46. The fiber of claim 45 having a denier from about 0.5 to 20.
- 10 47. A fiber comprising a sulfonated aliphatic-aromatic copolyester of claim 1 and at least one other polymer.
48. The fiber of claim 47 wherein said fiber comprises a blend of said sulfonated aliphatic-aromatic copolyester and one or more natural fibers.
- 15 49. The fiber of claim 47 wherein said fiber is a heterogeneous fiber.
50. A foamed article comprising a sulfonated aliphatic-aromatic copolyester of claim 1.
- 20 51. A foamed article comprising a sulfonated aliphatic-aromatic copolyester of claim 16.
52. A shaped article formed from a sulfonated aliphatic-aromatic copolyester of claim 1.
- 25 53. A shaped article formed from a sulfonated aliphatic-aromatic copolyester of claim 16.
- 30 54. A shaped article of claim 52 selected from the group consisting of films, sheets, fiber, melt blown containers, molded parts, and foamed parts.

55. A film comprising a sulfonated aliphatic-aromatic copolyester of claim 16.
56. The film of claim 55, having a thickness from about 0.025 mm to about 0.15 mm.
57. An oriented film according to claim 55.
58. A multilayer film comprising a layer comprising a sulfonated aliphatic-aromatic copolyester of claim 16.
59. An article comprising a substrate and a coating on said substrate, said coating comprising a sulfonated aliphatic-aromatic copolyester of claim 16.
60. An article comprising a substrate having laminated thereon a sulfonated aliphatic-aromatic copolyester of claim 16.
61. A wrap comprising a sulfonated aliphatic-aromatic copolyester of claim 16.
62. A sheet comprising a sulfonated aliphatic-aromatic copolyester of claim 16.
63. A foamed article comprising a sulfonated aliphatic-aromatic copolyester of claim 20.
64. A shaped article formed from a sulfonated aliphatic-aromatic copolyester of claim 20.
65. A shaped article of claim 64 selected from the group consisting of films, sheets, fibers, melt blown containers, molded parts, and foamed parts.

66. A film comprising a sulfonated aliphatic-aromatic copolyester of claim 20.
67. The film of claim 66, having a thickness from about 0.025 mm to about 0.15 mm.
68. An oriented film according to claim 66.
69. A multilayer film comprising a layer comprising a sulfonated aliphatic-aromatic copolyester of claim 20.
70. An article comprising a substrate and a coating on said substrate, said coating comprising a sulfonated aliphatic-aromatic copolyester of claim 20.
71. An article comprising a substrate having laminated thereon a sulfonated aliphatic-aromatic copolyester of claim 20.
72. A wrap comprising a sulfonated aliphatic-aromatic copolyester of claim 20.
73. A sheet comprising a sulfonated aliphatic-aromatic copolyester of claim 20.
74. A foamed article comprising a sulfonated aliphatic-aromatic copolyester of claim 20.
75. A shaped article formed from a sulfonated aliphatic-aromatic copolyester of claim 20.
76. A shaped article of claim 75 selected from the group consisting of films, sheets, fiber, melt blown containers, molded parts, and foamed parts.

77. A foamed article comprising a sulfonated aliphatic-aromatic copolyester of claim 24.
- 5 78. A shaped article formed from a sulfonated aliphatic-aromatic copolyester of claim 24.
79. A shaped article of claim 78 selected from the group consisting of films, sheets, fiber, melt blown containers, molded parts, and foamed parts.
- 10 80. A film comprising a sulfonated aliphatic-aromatic copolyester of claim 24.
81. The film of claim 80, having a thickness from about 0.025 mm to about 0.15 mm.
- 15 82. An oriented film according to claim 80.
83. A multilayer film comprising a layer comprising a sulfonated aliphatic-aromatic copolyester of claim 24.
- 20 84. An article comprising a substrate and a coating on said substrate, said coating comprising a sulfonated aliphatic-aromatic copolyester of claim 24.
- 25 85. An article comprising a substrate having laminated thereon a sulfonated aliphatic-aromatic copolyester of claim 24.
86. A wrap comprising a sulfonated aliphatic-aromatic copolyester of claim 24.
- 30 87. A sheet comprising a sulfonated aliphatic-aromatic copolyester of claim 24.

88. A process for producing a package, comprising providing a substrate; forming said substrate into a desired package form; providing a sulfonated aliphatic-aromatic copolyester comprising an acid component, a glycol component, and 0 to about 5.0 mole percent of a polyfunctional branching agent; wherein said acid component comprises:
- a. about 94.9 to 10.0 mole percent of an aromatic dicarboxylic acid component based on 100 mole percent total acid component,
 - b. about 5.0 to 80.0 mole percent of an aliphatic dicarboxylic acid component, based on 100 mole percent total acid component, and
 - c. about 0.1 to about 5.0 mole percent of a sulfonate component, based on 100 mole percent total acid component;
- and wherein said glycol component consists essentially of:
- a. 100.0 to 90.0 mole percent of 1,3-propanediol as a first glycol component, based on 100 mole percent total glycol component, and
 - b. 0 to 5.0 mole percent of a second glycol component, based on 100 mole percent total glycol component; and
- laminating or coating said substrate with said sulfonated aliphatic-aromatic copolyester to form said package.
89. The process of claim 88 wherein said substrate comprises a material selected from the group consisting of paper, paperboard, inorganic foams, organic foams, and inorganic-organic foams.
90. The process of claim 88 wherein said package form is selected from the group consisting of wrappers, stretch wrap films, bags, cups, trays, cartons, boxes, bottles, crates, packaging films, blister pack wrappers, skin packaging, and hinged containers.

91. A process for producing a sulfonated aliphatic-aromatic copolyester, comprising providing a reaction mixture comprising an aromatic dicarboxylic component, an aliphatic dicarboxylic acid component, a sulfonate component, a first glycol component consisting essentially of 1,3-propanediol, optionally a second glycol component, and optionally a polyfunctional branching agent; and allowing said aromatic dicarboxylic acid component, said aliphatic dicarboxylic acid component, said sulfonate component, said first glycol component, said second glycol component and said polyfunctional branching agent to polymerize to form a sulfonated aliphatic-aromatic copolyester comprising an acid component, and a glycol component, wherein the acid component comprises
- a. about 94.9 to 10.0 mole percent of an aromatic dicarboxylic acid component based on 100 mole percent total acid component,
 - b. about 5.0 to 80.0 mole percent of an aliphatic dicarboxylic acid component, based on 100 mole percent total acid component, and
 - c. about 0.1 to about 5.0 mole percent of a sulfonate component, and wherein the glycol component comprises 100.0 to about 90.0 mole percent of 1,3-propanediol as said first glycol component, based on 100 mole percent total glycol component.
92. The process of claim 91, comprising providing said second glycol component in a quantity such that the glycol component of said polyester comprises up to 5.0 mole percent of said second glycol component, based on the total of said first glycol component and said second glycol component.
93. The process of claim 91, comprising providing said polyfunctional branching agent in a quantity such that said

polyester comprises up to 5.0 mole percent of said polyfunctional branching agent, based on the total of said first glycol component, said second glycol component, and said polyfunctional branching agent.

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